

East Bloomsburg Bridge  
Spanning the Susquehanna River at Pennsylvania  
Traffic Route 487 (Legislative Route 283)  
Bloomsburg  
Columbia County  
Pennsylvania

HAER No. PA-100

HAER  
PA  
12-Bloom  
1-

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD

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East Bloomsburg Bridge

HAER No. PA-100

Location: Spanning the Susquehanna River at Pennsylvania Traffic Route 487 (Legislative Route 283)  
Bloomsburg, Columbia County, Pennsylvania

UTM:  
Quad: Catawissa

Date of Construction: 1894

Builder/Engineer: King Bridge Company - Superstructure  
Joseph Hendler - Substructure

Present Owner: Pennsylvania Department of Transportation  
Transportation and Safety Building  
Harrisburg, Pennsylvania 17120

Present Use: The East Bloomsburg Bridge carries vehicular traffic on Traffic Route 487 over the north branch of the Susquehanna River from Ferry Road to the town of East Bloomsburg in Catawissa Township. It provides direct access to U. S. Route 11, a major north-south highway serving east-central Pennsylvania. The current average daily traffic (ADT) on the bridge is 6,000 vehicles. Demolition of the bridge is scheduled to occur in 1987.

Significance: The existing East Bloomsburg Bridge consists of six equal pin-connected through-truss spans of 190 foot length with two feet between end bearings at the piers for a total length of 1150 feet. The truss spans are of the "Pennsylvania" (Petit) type with 10 equal panels of 19 feet each. The truss members are made of steel and wrought iron, and the pins were made of steel. The significance of the structure is twofold; one, that it was constructed prior to 1900 and, two, that it was built by the King Bridge Company, one of the most important truss bridge manufacturing companies in the United States in the 19th century. The bridge also exhibits a high degree of its original integrity.

Project Information: The Federal Highway Administration (FHWA) and the Pennsylvania Department of Transportation (PennDOT) propose to replace the existing Traffic Route 487 (L. R. 283) Bridge (locally known as the East Bloomsburg Bridge) over the north branch of the

Susquehanna River at the town of Bloomsburg, Columbia County, Pennsylvania, with a new structure. The existing through-truss bridge, determined eligible for the National Register of Historic Places, would be demolished as part of the proposed bridge replacement project in accordance with the Memorandum of Agreement on the East Bloomsburg Bridge dated December 3, 1984.

The Pennsylvania Department of Transportation, in cooperation with the Federal Highway Administration, is the responsible agency for this bridge replacement project, and the project is scheduled for the first four years of the Pennsylvania Department of Transportation Twelve Year Program and in Act 235 (Billion Dollar Bridge Program). Federal authority to undertake the project is found in Title 23, Chapter 1, of the U. S. Code of Federal Regulations.

The Memorandum of Agreement also stipulates that FHWA, PennDOT, the Pennsylvania State Historic Preservation Officer (SHPO), and the Advisory Council on Historic Preservation shall implement a documentation of the present bridge, so that there will be a permanent record of its existence. The Historic American Engineering Record (HAER), National Park Service, U. S. Department of the Interior, Washington, D. C., shall be the accepting agency. This documentation has been prepared by Modjeski and Masters, Consulting Engineers, Harrisburg, Pennsylvania.

Edited, Retyped  
and Transmitted by: Jean P. Yearby, HAER, 1987

### History of Crossing

On August 23, 1892, a petition was presented to the court by citizens asking for a free county bridge across the Susquehanna River at Bloomsburg. On that same day, the court appointed C. H. Moore, M. C. Vance and Simon Hons, viewers, to report on the same. On September 21, a petition was presented by citizens of Catawissa to stay the proceedings. An answer was filed and depositions taken, and Judge Savidge of Sunbury was called in by Judge Ikeler to hear and decide the case. The latter petition was dismissed by Judge Savidge and, to this action, exceptions were filed, as well as a petition for reviewers, with the first viewers reporting in favor of a bridge. After some skirmishing between the parties, C. W. Eves, W. S. Fisher and G. B. Hendershott were appointed. On May 1, 1893, they reported in favor of a bridge; this report was laid before the Grand Jury on May 3 and approved by them with the recommendation that the bridge be erected at the expense of the county.

The nearby borough of Catawissa had a covered wooden toll bridge, which was built in 1833, destroyed in 1875, rebuilt in 1875, and made toll-free in 1893. Due to the age of this structure and the jeopardy to destruction from ice jams and floods, the citizens of Catawissa believed that available county funds should be first used for construction of a county bridge at the site of the existing bridge at Catawissa. The petition to stay the proceedings of the Bloomsburg Bridge was the result.

On May 4th, more exceptions were filed by opponents of the bridge, and the matter dragged along until November 9th, when the court made the following order: "And now, November 9, 1893, all exceptions having been withdrawn in open court and all adverse proceedings abandoned, the report of the reviewers and Grand Jury is approved, and it is adjudged that the said bridge is necessary as a county bridge, and that the same is too expensive for the township of Catawissa and the Town of Bloomsburg to bear, and upon the concurrent approval of the same by the county commissioners the said bridge is ordered to be entered of record as a county bridge."

The commissioners concurred, and on November 24th they had a letting, and after due consideration awarded the contract for the superstructure to the King Bridge Company, and for the masonry and other work to Joseph Hendler. J. C. Brown was employed by the commissioners to prepare the plans and specifications, and to make an estimate of cost, and also to be the supervising engineer for the work. The estimated cost was \$69,256. Jesse Rittenhouse, B. F. Edgar and C. L. Sands were the county commissioners at the time. The bridge is iron and steel, and is 1,150 feet long, with six spans. The cost of the superstructure was \$35,500; of the substructure \$35,415.46, and the riprapping and filling \$2,384.21, making the total cost \$73,299.67.

The site selected for the new free county bridge was at the foot of Bloom Ferry Road, the road which provided access to the ferry across the Susquehanna

River. Before the bridge was built, the ferry was the route to areas south of the Susquehanna and the connection to the Centre Turnpike Road, the approximate route of today's Pennsylvania Route 61 from Sunbury to Reading.

By building the bridge at the ferry site, Bloomsburg was provided with a more direct link to the coal regions to the south and to Pottsville and Reading by way of the Centre Turnpike Road.

The bridge was built just as the economy of Bloomsburg was undergoing a substantial change. The local iron ore was exhausted, causing a decline in Bloomsburg's iron industry. New types of businesses were introduced, including textile mills and small manufacturing enterprises, that established the diversified pattern of industry that has persisted in the twentieth century. The East Bloomsburg Bridge, by providing a more direct and efficient transportation link to suppliers and markets, improved Bloomsburg's ability to make this economic transition.

#### Selection of Contractor

A copy of the original contract between the Columbia County Commissioners and the King Bridge Company to build the East Bloomsburg Bridge is attached. The contract stipulated that the King Bridge Company was to build, paint (two coats), and have ready by October 1, 1894, the superstructure for a wrought iron bridge over the Susquehanna River at a point where the Bloom Ferry Road crossed said stream in the county of Columbia and State of Pennsylvania.

The abovementioned standard documents from the King Bridge Company also stipulated only the following details of the bridge:

Extreme length of bridge	1,150 feet
Space between the face of the abutments or waterway	-- feet
Roadway	18 feet
Sidewalks	None
Number of spans	Six (6) equal spans

The contract cost was agreed to be \$35,500.

The King Iron Bridge and Manufacturing Company, founded by Zenas King, was established on January 26, 1871. By 1884, the company was one of the leading bridge builders in the United States. Prior to the formation of the King Iron Bridge and Manufacturing Company, Zenas King had acquired a great deal of experience in manufacturing and engineering. King made his career in 1848 when he established a mercantile business in Milan, Ohio, with C. H. Buck. In 1856, Mr. King became a traveling agent for Scott and Hedges Company and, in 1858, traveling agent for the Moseley Bridge Company which specialized in a unique triangular, tubular, wrought iron arch bridge. During this work with

Moseley, King was impressed by the fallibility of wooden bridges and the potential offered by the metal arch. Thus, it was no surprise that his first of a number of bridge designs was the "King Patent Tubular Arch," patented in 1861. King substituted a square-shaped tube for the triangular Moseley design. By this time, King had relocated to Cleveland and established a boiler and bridge works, although boiler manufacturing was soon dropped as the tubular arch grew in popularity.

King first met considerable resistance to his design. It had much less iron than earlier metal trusses, and its comparative inexpensive cost resulted in skepticism. Furthermore, the visual slenderness of the truss components seemed too drastic a change from the massive wooden members. King, however, was able to overcome these obstacles to incorporate in 1871 what literally became one of the nation's largest and most successful iron bridge companies. The firm manufactured an assortment of trusses, including a number of other King-patented trusses, but it was the tubular arch bridge that made the company's reputation and fortune.

The King Bridge Company sold bridges throughout the nation through agents. The contracting agent for the East Bloomsburg Bridge was V. Morris. The contracting agents each had their own King Bridge Company brochure for prospective clients. Typically, each brochure contained the following:

#### "GENERAL SPECIFICATIONS

These structures are proportioned to sustain the passage of the heaviest travel. The iron-work will be so proportioned that the load, in addition to the weights of the structures themselves, shall not strain the iron over 12,000 pounds per square inch tensile, or 7,500 pounds per square inch shearing strain, and reducing the strain in compression in proportion to the ratio of length to diameter, by Gordon's formula.

The iron used under tensile strain shall be of tough and ductile quality, and be capable of sustaining 60,000 pounds per square inch of section. Each superstructure to consist of plank and timber flooring, supported by two or more trusses of wrought iron. The trusses to be composed of Wrought Iron Arches, Chords, Uprights and Diagonals.

Persons requiring Bridges, please give us the following information: Number of Spans required; length of each Span between face of piers at top; width of Roadway in the clear; width of Sidewalks, if any; if on a skew, give the angle.

With the abovementioned data furnished, we will furnish estimates and plans."

### Description of Bridge

The King Bridge Company of Cleveland, Ohio, constructed the first Bloomsburg Bridge as a Pennsylvania (Petit) pin-connected, through-truss bridge to span the Susquehanna River with six spans of 190 feet length each.

The original preliminary drawing of the bridge for one span was dated November 29, 1893. It indicated a ten-panel through truss of 18.9 foot panels for a total length of 189 feet. The actual detail drawings, dated January 17, 18 and 19, 1894, indicate panel lengths of 19 feet, for a total truss length, bearing-to-bearing, of 190 feet. The truss has a polygonal top chord with subdivided panels and is called a "Pennsylvania" truss. The "Pennsylvania" truss is also sometimes termed a "Petit" truss. The evolution of the Pennsylvania (Petit) type truss began with a "Pratt" truss. In order to use this truss for longer spans, C. H. Parker introduced the idea of making the top chord of the "Pratt" truss for longer spans. They subsequently modified the "Parker" truss in the same manner by deepening and subdividing the panels and called it a "Pennsylvania" truss. Both the "Baltimore" and "Pennsylvania" trusses are sometimes referred to as "Petit" trusses and therefore the implication seems to be that a person by the name of Petit in the Pennsylvania Railroad Company organization was responsible for the conception of both of the above.

The East Bloomsburg Bridge consist of six 190-foot spans with two feet between each end bearings at each pier, for a total length of 1,150 feet. Each span consists of ten 19-foot panels which vary in height from 22 feet to 34 feet. The trusses are spaced at 19 feet, 2 inches, which provides a roadway width of 18 feet. The bridge contains no sidewalks. The abutments and five piers were faced with stone masonry.

The trusses were designed for a "Static Load of 732 lbs. per linear foot" and a "Rolling Load of 1440 lbs. per linear foot." The roadway plank, stringers and floor beams were designed for "100 lbs. per square foot" and the "Factor of Safety was 4."

The material of the structural shapes, floor beams and pins is steel and the plates and eyebars are of wrought iron. Approximately in 1893, steel became the predominant material for shapes such as angles, channels and I-beams, and for this bridge, the steel shapes came from Carnegie Steel Company. The roadway floor consisted of 2-1/2-inch oak flooring supported by stringers consisting of two lines of 7-inch channels by 8.5 pounds and five lines of 7-inch channels by 15.5 pounds. The stringers were supported by the steel floor beams which are 15 I-beams by 41 pounds.

The longer span trusses built by the King Bridge Company of the "Pennsylvania" type truss are almost extinct and this may be the only remaining one in Pennsylvania. They are noted by the ornate wrought iron finials which decorate

the endposts and by the lattice work which runs along the portal struts and vertical and diagonal posts.

The contract for the substructure of the bridge was given to Joseph Hendler of Wilkes-Barre, Pennsylvania. The contract for the substructure was an estimate, since the work was to be paid for at unit costs for excavation, both above and below water, and for stonework. It was indicated (Bloomsburg Daily, November 29, 1893) that Mr. Hendler had considerable experience for this type of work. They were informed that he had constructed the masonry for "no less than six bridges across the river and that he did the work for the new Railroad bridge for the Lehigh Valley above Wilkes-Barre."

The plans for the bridge required that the stonework be of substantial character, each stone to be of great size and the piers and abutments when completed to be similar to those seen in the construction of railroad bridges. The actual plans only showed the outline dimensions of the piers and abutments.

An inspection report filed by John A. Wilson, Civil Engineer, for the Columbia County commissioners and reported in the Bloomsburg Daily of April 11, 1894, indicated substantial problems with the construction and design of the substructure. The following is a partial quote from Mr. Wilson's report:

"The filed plans do not indicate the character of the proposed foundations, but the detailed masonry plans and Mr. Brown's verbal explanation indicate that Pier No. 1 (from the South side of the river) will be located on the rock, the foundation being put in through the medium of a coffer dam. For the other four piers, my understanding is that it is proposed to use timber platforms on the present bed of the river, the platform being floated into place, wooden sides being built up to exclude the water, thus forming a caisson, and the caisson being sunk with the weight of the masonry built inside of it. On inquiry I am informed that the bottom of the river is formed of gravel and coal dirt, but that no examinations have been made to ascertain what is below the surface of the gravel.

It seems to me that a great risk is being taken, in founding the piers of an expensive and important bridge in the river bottom, without any knowledge of what is below. Assuming, however, that the river bottom is hard gravel, it will be necessary to protect the timber bottom with riprap (which is not provided for in plans specifications or contracts) and obstructions will thus be formed in the river, the result of which will be to cause the channels in the river to deepen by washing. This, it is well known, will occur in the hardest gravel, and in a few years the bottom of the piers might be above the rest of the river bed, with more or less



tendency to be injured with heavy freshnets or ice floods. My opinion is that the foundations of the piers should be placed not less than 3 to 4 feet below the present river river bottom except where they rest on rock. It might be found by examination, that rock could be reached at a reasonable depth below the river bottom, in which case it would be advisable to use coffer dams and sink to it. The same question comes up relative to the foundations of the north abutment. When I was at the site the excavation had been made a few feet in depth. The material was hard gravel but with water flowing freely as if from springs, I was informed that after I left the place on March 30, the foundation timbers were hurried in for fear that quicksand might be struck. Mr. Brown, however, said to me that he had tested the place with bars and found several feet of gravel below the proposed foundation level.

If I were professionally responsible for the work. I would want to make more satisfactory examinations before constructing an abutment for a large river bridge of that kind, and if there were any quicksand there, I should want to know it before putting masonry on it. The south side abutment I understand is on rock which of course makes a good foundation. I have stated that the dimensions of the piers appear to be sufficient, but I regret that I cannot say the same of the abutments."

As noted on the pier plans, the date is April 12, 1894, and therefore, it was probably revised and founded on rock at a lower elevation. There is no evidence that the design of the abutments and wingwalls was changed from the original plan dimensions, although the drawing plan date is May 1, 1894. The present condition of the abutment and wingwalls can be observed and they can be described as excellent, with no evidence whatsoever of any movement or deterioration.

#### Decline and Recent History

Originally opened to traffic in 1894, the existing East Bloomsburg Bridge is a six-span "Pennsylvania" through-truss structure, with spans of 190 feet each. The roadway consists of two 8 feet, 3 inch lanes, with no shoulder or sidewalks. Vertical clearance varies from 16 feet, 0 inch at the curb line to 16 feet, 11 inches over the center 10-foot width of the bridge.

The East Bloomsburg Bridge was in constant use until 1914, at which time the Columbia County commissioners let a contract to the Farris Bridge Company to redeck the bridge. This construction consisted of the placement of a 4-inch laminated wood floor, overlaid with a bituminous surface and resulted in an

overall roadway width of 16 feet, 8 inches between curbs. In 1924, the county let a contract to lay new 3-inch white oak plank diagonally to the existing floor.

By 1954, the bridge began to deteriorate structurally and, therefore, the Pennsylvania Department of Highways let a contract to the High Welding Company of Lancaster, Pennsylvania, to redeck the bridge with an open steel grid, install steel guard rails, and reinforce various structural members.

The bridge, previously posted at 13 tons and limited to one truck, has recently been posted with a 10-ton weight limit, due to severe structural deterioration discovered in a PennDOT bridge inspection.

According to the bridge inspection report, completed by PennDOT in March 1984, the structure had some serious deficiencies which required immediate emergency repairs. These deficiencies included severe rusting and critical section loss on most primary and secondary truss members and severe spot rust on stringers, floor beams, portals and upper strut bracing, and bridge deck. Span 1 also had sectional loss on the floor beams and stringers. Following the emergency repairs, the posting was raised to 10 tons; still with a restriction to one truck on the bridge at any given time.

A major traffic route for approximately 6,000 daily users, the existing narrow and deteriorating East Bloomsburg Bridge creates several social and economic hardships for the local communities and businesses. The structure has recently been posted with a 10-ton weight limit. Trucks over 10 tons must detour approximately 20 miles to I-80 at Mifflinville, or detour approximately 40 miles to the Danville Bridge on Route 54. The existing facility is not adequate for present traffic volumes and loads. Replacement of the East Bloomsburg Bridge is included in the Federal Critical Bridge Program, the PennDOT 12-year Highway Program, and is also included in the Billion Dollar Bridge Program created by Act 235.

The age of the structure, combined with its lightweight truss construction, cause the bridge to be structural inadequate for current transportation demands. This has also been established by detailed structural analysis. The restrictive horizontal clearance, as well as the bridge posting, indicate that the structure is functionally obsolete. The bridge no longer serves the needs of the area.

#### Sources of Information

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- B. Bloomsburg University Library
- C. Bloomsburg Area Chamber of Commerce

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Federal Highway Administration and Pennsylvania Department of Transportation. "Composite Technical Basis Report," East Bloomsburg Bridge Replacement Study, September 1984.

#### List of Preparers

Final Design Consultant and Preparer: Modjeski and Masters  
Consulting Engineers  
Harrisburg, PA.

Text written by: Russell W. Christie, P.E.  
Project Manager  
Modjeski and Masters

Contract No. ....

# THE KING BRIDGE CO.

WITH

*James Pittenbarger B. F. Edgar  
Co. Clark County Va  
Columbia County Va*

Extreme Length 1150

Roadway 15 ft

No. of Spans 10

Style

Date

Price

To be Completed

# MEMORANDA.

Shipping Point

Correspondent

Address

Lumber ordered of

Address

Price per 1000 feet

Lumber Bill

No. ....

This Contract. Made this 20<sup>th</sup> day of November A. D. 1893.

by and between **THE KING BRIDGE CO.**, of the City of Cleveland and State of Ohio, party of the first part, and The County of Columbia by and through its commissioners Jesse Rittenhouse, B. F. Edgar, and C. L. Sands of the County of Columbia and State of Pennsylvania, party of the second part;

Witnesseth, That the said party of the first part contracts and agrees to and with the party of the second part, to build, paint <sup>two coats</sup> ~~one coat~~ at ~~same~~, and have ready by the First day of October 1894.

for the party of the second part, the superstructure for a Wrought Iron Bridge over the stream called The Susquehanna River at a point where the Bladen Ferry Road crosses said stream in the County of Columbia and State of Pennsylvania according to the following dimensions, viz:

Extreme Length of Bridge,	1150	feet.
Space between the face of Abutments or Waterway,		feet.
Roadway,	18	feet.
Sidewalks,		
Number of Spans,	six (6) equal spans	

All the materials for said bridge, except the abutments and piers, are to be furnished by the party of the first part. Specifications and Plans approved form a part of this Contract. The center line of bridge to be at right angles to the abutments and piers. Delay in approving plans or furnishing necessary data, plans, specifications, etc., by party of the second part to party of the first part shall extend the time of completion an equal number of days.

And the party of the second part contracts and agrees to furnish, ready for the superstructure, the abutments and piers for said bridge by the First day of August, A. D. 1894, and to pay the party of the first part the sum of Thirty five Thousand Five Hundred (\$35,500.00) Dollars for the said Bridge, payable as follows, viz: In monthly estimates upon acceptable material, at the shops, delivered on the ground, and in course of erection, ninety per cent. of the amount of such estimates, to be paid in cash within five days from date of estimate, the remaining ten per cent. to be paid in cash on final completion and acceptance of the work herein specified, ~~on receipt of the day of delivery of the iron material of said Bridge at~~ Station and the remaining one half on the completion of said Bridge. In case the abutments and piers are not ready for the superstructure on the date agreed as above, eighty per cent. of contract price (less previous estimates) shall be paid on delivery of the iron, and the remaining twenty per cent. as provided above.

This contract is made subject to the provisions of the laws of Pennsylvania relative to the appointment of Bridge inspectors, and also to the Constitution of the State, as it is understood by the parties hereto that the County will construct the proposed bridge, utilizing a loan of money be authorized therefor according to law.

~~And the party of the second part further agrees to leave the party of the first part have free use of the old bridge at or near the said place, for the putting up of the work and the purpose as may be for completion in erecting said bridge. And the party of the first part are not to be held responsible for unavoidable delays caused in transportation or by the elements, mobs, enemies of the Government, strikes of workmen in the employ of the first party or of manufacturers under contract with it for the furnishing of materials for such work, acts of Providence, or delays over which they have no control.~~

Signed the day and year first above written,

**THE KING BRIDGE CO.,**

In Presence of  
Witnesses  
Attestation

Per. J. G. Brown [SEAL]  
Jesse Rittenhouse [SEAL]  
B. F. Edgar [SEAL]  
C. L. Sands [SEAL]  
[SEAL]  
[SEAL]

Attest  
Clerk